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RUSTS ON COMPOSITAE FROM MEXICO

J. C. ARTHUR

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The following enumeration of two hundred collections of Mexican rusts on Compositae comprises part of Mr. E. W. D. Holway's material obtained on his several trips into Mexico, not heretofore published; together with two specimens collected by C. G. Pringle, communicated by Mr. Holway; two by Rose and Painter, communicated by Dr. J. N. Rose; one by E. W. Nelson, communicated by Dr. W. G. Farlow; and one by Seler, found in the phanerogamic herbarium of the N. Y. Botanical Garden. Of the fifty-four species in the list it has been found necessary to describe eighteen as new.

It is interesting to note that the genus Puccinia embraces three-fourths of all the species, and the genus Coleosporium one-half of the remaining number. Two new species are described under Dietelia, with some misgivings. Both of them are accompanied with spermogonia, and are devoid of a peridium. Whether these differences should constitute valid ground for separation into a new genus is problematical without further knowledge of their life histories and affinities. Cronartium, Pucciniosira, Uredo, and Æcidium with one species each, and Uromyces with two species are the remaining genera.

The present communication is another illustration of Mr. Holway's skill as a collector, and his service in making known the Mexican rust flora.

1. Coleosporium Viguierae Diet. and Holw.

On *Viguiera helianthoides* HBK., Tehuacan, Nov. 18, 1903, no. 5355; *V. dentata* Spreng., City of Mexico, Oct. 14, 1898, no. 3055.

2. Coleosporium Verbesinae Diet. and Holw.

On *Verbesina virgata* Cav., Oaxaca, Oct. 21, 1899, no. 3711; Cuernavaca, Oct. 30, 1903, no. 5298; Amecameca, Nov. 20, 1903, no. 5427: *V. montanoifolia* Rob. & Greenm., Patzcuaro, Oct. 19, 1898: *V. pinnatifida* Cav., Oct. 1896.

3. Coleosporium anceps Diet. and Holw.

On *Verbesina sphaerocephala* A. Gr., Sayula, State of Jalisco, Oct. 7, 1903, no. 5124; Zapotlan, State of Jalisco, Oct. 10, 1903, no. 5145.

4. COLEOSPORIUM SOLIDAGINIS (Schw.) Thuem.

On *Aster pauciflorus* Nutt., City of Mexico, Oct. 10, 1898, no. 3071 a.

5. COLEOSPORIUM PARAPHYSATUM Diet. and Holw.

On *Liabum discolor* Benth. and Hook., Guadalajara, Sept. 28, 1903, no. 5062.

6. **Coleosporium Dahliae,** n. sp.—Uredosori hypophyllous, irregularly scattered, round, 0.5^{mm} across or less, soon naked, pulverulent; uredospores irregularly ellipsoid, 16–22 by 24–30μ, wall colorless, rather thin, 2μ, closely and strongly verrucose: teleutosori hypophyllous, irregularly scattered, sometimes confluent, roundish, about 0.5^{mm} across, waxy; teleutospores oblong, 18–21 by 45–70μ, rounded at both ends, early septate, bright orange-yellow fading to pale olive-yellow.

On *Dahlia variabilis* (W.) Desf., in city park, Guadalajara, Oct. 6, 1903, no. 5121.

7. **Coleosporium Steviae,** n. sp.—Uredosori hypophyllous, scattered unevenly and often thickly, round, 0.25–0.5^{mm} across, early naked, pulverulent; uredospores ellipsoid to globoid, somewhat angular, 18–23 by 26–35μ, wall colorless, rather thin, 1.5–2μ, finely verrucose: teleutosori hypophyllous, scattered, often confluent, irregularly orbicular, 0.25–0.5^{mm} across, waxy; teleutospores forming a single layer beneath the epidermis, cylindrical, 12–19 by 50–75μ, truncate or rounded at both ends.

On *Stevia trachelioides* (DC.) Hook., Nevada de Toluca, 3,000^{m} alt., Oct. 15, 1903, no. 5159 (type): *S. rhombifolia* HBK., Amecameca, Oct. 20, 1903, no. 5186; Rio Hondo, near City of Mexico, Oct. 4, 1899, no. 3565: *S. viscida* HBK., Santa Fé, near City of Mexico, Oct. 18, 1903, no. 5172: *S. reglensis* Benth., Santa Fé, near City of Mexico, Oct. 18, 1903, no. 5169: *S. monardaefolia* HBK., Cuernavaca, Sept. 26, 1898, no. 3014; Amecameca, Oct. 20, 1903, no. 5181: *S. salicifolia* Cav., Patzcuaro, Oct. 17, 1898, no. 3008; Toluca, Sept. 17, 1898, no. 3135, Sept. 4, 1903, no. 6778 (*Rose & Painter*); Pachuca, Oct. 27, 1903, no. 5248; Santa Fé, near City of Mexico, Oct. 18, 1903, no. 5176.

8. CRONARTIUM PRAELONGUM Wint.

On *Eupatorium* sp., Orizaba, Oct. 8, 1898, no. 3041.

9. **Dietelia Eupatorii,** n. sp.—Spermogonia amphigenous, numerous, crowded in small groups, punctiform, rather conspicuous, immersed, subepidermal, globoid, 100–150μ broad; ostiolar filaments becoming agglutinate: teleutosori hypophyllous and caulico-

lous, crowded in orbicular groups, often circinating about the spermogonia, on stems causing small swellings up to 1^{cm} long, on discolored spots, very small, 0.2–0.3^{mm} across, round, somewhat waxy; peridia wanting; spores ellipsoid, more or less angular from pressure, 20–25 by 24–36μ, wall golden-brown, smooth, medium thick, 1.5–2μ.

On *Eupatorium patzcuarense* HBK., Amecameca, Oct. 21, 1903, no. 5205 (type): *Eupatorium* sp., near City of Mexico, Oct. 9, 1898, no. 3033.

This and the following are the first species belonging to this genus reported from North America. They both differ from the type in the absence of a peridium, and in the presence of spermogonia. Like the type, however, they both have the sori separated from the tissues of the host by a filamentous layer of delicate, colorless hyphae. The form on Eupatorium is waxy, with smooth consolidated spores, like the type, the spores germinating in the sorus upon maturity. The form on Vernonia is not waxy, but pulverulent.

10. **Dietelia Vernoniae,** n. sp.—Spermogonia chiefly epiphyllous, numerous, crowded in orbicular groups, punctiform, golden-yellow becoming brown, prominent, subepidermal, depressed-globoid or somewhat conical, 130–145μ broad; central cavity large; ostiolar filaments becoming agglutinate: teleutosori hypophyllous, crowded opposite the spermogonia in annular groups of 2–7, or solitary, round, 0.5^{mm} across, soon naked, pulverulent, ruptured epidermis noticeable; peridia wanting; teleutospores ellipsoid or globoid, more or less angular and irregular from pressure, 22–27 by 30–37μ; wall very pale yellow, medium thick, 1.5–2μ, closely and strongly verrucose, except a small spot at the base, tubercles somewhat deciduous.

On *Vernonia* (probably *V. Deppiana* Less.), Jalapa, Mex., Oct. 2, 1898, no. 3111.

11. Pucciniosira Brickelliae Diet. and Holw.

On *Brickellia secundiflora* A. Gr., Pachuca, Oct. 27, 1903, no. 5249: *Brickellia* sp., Guadalajara, Sept. 22, 1903, no. 5020; Zapotlan, State of Jalisco, Oct. 10, 1903, no. 5144; Amecameca, Nov. 20, 1903, no. 5428.

12. Uredo Parthenii Speg.

On *Parthenium hysterophorus* L., San Andres Chalchicomula, near Mt. Orizaba, Oct. 8, 1898, no. 3228.

13. Æcidium Clibadii Syd.

On *Clibadium arboreum* J. D. Smith, Jalapa, Oct. 2, 1898, no. 3114.

14. **Uromyces senecionicola,** n. sp.—Teleutosori hypophyllous,

thickly scattered, irregularly roundish, 0.5^{mm} or less across, long covered by the grayish epidermis; teleutospores obovoid, more or less angular, 20–25 by 24–36μ, obtuse or rounded at apex, narrowed at base, wall golden-brown, rather thin, 1–2μ, much thicker at apex, 3–6μ, concolorous; pedicel nearly colorless, thick, two-thirds length of spore or less.

On *Senecio Roldana* DC., Amecameca, Oct. 20, 1903, no. 5183 (type), Oct. 31, 1899, no. 3752: *Cacalia* sp., Patzcuaro, Oct. 20, 1898, no. 3182.

The morphological characters and gross appearance of this species closely resemble those of *Puccinia senecionicola*, except that the teleutospores are one-celled instead of two-celled. A very few uredospores were seen, which resembled those of *P. senecionicola* closely, except that they were quite colorless, which may have been due to weathering, or to their origin in teleutosori as an obsolescent form of spore. A single group of hypophyllous aecidia was also found, accompanied by epiphyllous spermogonia, but too old for securing accurate characterization.

15. Uromyces cucullatus Syd.

On *Zexmenia* sp., Iguala, Oct. 4, 1900 (*C. G. Pringle*): *Perymenium Berlandieri* DC., Amecameca, Oct. 31, 1899, no. 3753: *P. verbesinoides* DC., Cuernavaca, Sept. 30, 1898, no. 3116: *P. Mendezii* DC., Pachuca, Oct. 5, 1899, no. 3578, Oct. 28, 1903, no. 5257: *P. discolor* Schrad., Oaxaca, Nov. 10, 1903, no. 5362, Nov. 14, 1903, no. 5417.

16. **Puccinia senecionicola,** n. sp.—Uredosori amphigenous, somewhat gregarious or solitary, round, small, tardily naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; uredospores globoid, 24–27 by 25–32μ, wall cinnamon-brown, thin, sparsely and strongly echinulate, pores 2, opposite in the equator: teleutosori hypophyllous, thickly scattered and somewhat confluent, punctiform or bullate, long covered by the epidermis; teleutospores oblong or oblong-clavate, 16–27 by 42–60μ, obtuse, truncate or even rounded at apex, and often oblique, more or less narrowed at base, slightly or not constricted at septum, wall golden-brown, sometimes darker above, rather thin, little to much thickened at apex, 3–12μ, concolorous; pedicel short, nearly colorless.

On *Senecio angulifolius* DC., Amecameca, Oct. 20, 1903, no. 5189 (type), Oct. 31, 1899, no. 3762; Pachuca, Oct. 6, 1899, no. 3586, Oct. 28, 1903, no. 5254; Oaxaca, Oct. 22, 1899, no. 3714; Nevada de Toluca, 10,500^{ft} alt., Oct. 15, 1903, no. 5162: *S. sinuatus* HBK., Pachuca, Oct. 28, 1903, no. 5252: *Cacalia Pringlei* Wats., Zapotlan, State of Jalisco, Oct. 9, 1903, no. 5143: *C. ampullacea*

Greenm., Pachuca, Oct. 5, 1899, no. 3572, Oct. 27, 1903, no. 5244: *C. sinuata* Cerv., Patzcuaro, Oct. 16, 1898, no. 3196: *C. amplifolia* DC., Oaxaca, Oct. 23, 1899, no. 3725: *C. obtusiloba* Rob. & Greenm., Cuernavaca, Sept. 30, 1899, no. 3538, Oct. 30, 1903, no. 5299; Patzcuaro, Oct. 17, 1898, no. 3171: *Cacalia* sp., Guadalajara, Sept. 14, 1899, no. 3417; Uruapan, Oct. 11, 1899, nos. 3617, 3618.

17. PUCCINIA TITHONIAE Diet. and Holw.

On *Tithonia tubaeformis* A. Gr., Acambora, Oct. 21, 1899, no. 3143; near Tula, Sept. 20, 1898, no. 3197: *T. speciosa* Hook., Sept. 28, 1898, no. 3119.

18. **Puccinia globulifera,** n. sp.—Uredosori hypophyllous, small, round, scattered, pulverulent, cinnamon-brown; uredospores globose, small, 15–18μ in diameter, wall medium thick, 2μ, cinnamon-brown, evenly and strongly echinulate, pores 2, opposite in the equator: teleutosori amphigenous, small, round, scattered, somewhat pulverulent, blackish; teleutospores oblong-globose, 22–25 by 24–32μ, semiopaque, rounded at both ends, not constricted at the septum, wall dark chocolate-brown, 3μ thick, closely and evenly aculeate with strong conical points; pedicel colorless except near the spore, slender, firm, 5–6μ thick, twice the length of the spore or longer, place of insertion indefinite, often at the septum.

On *Otopappus epalaceus Pringlei* Greenm., Iguala, Nov. 3, 1903, no. 5313.

This species is widely different from *P. Otopappi* Syd., which has smooth teleutospores of the common obovate-ellipsoid form.

19. PUCCINIA ASTERIS Duby.

On *Aster pauciflorus* Nutt., City of Mexico, Oct. 10, 1898, no. 3071.

20. **Puccinia Gymnolomiae,** n. sp.—Uredosori hypophyllous, scattered, small, early naked, pulverulent, bright cinnamon-brown; uredospores globoid or obovate-globoid, 20–24 by 21–27μ, wall golden yellow, rather thin, 1–2μ, closely and strongly echinulate, pores 2, opposite, in the equator or often much lower: teleutosori hypophyllous, scattered, small, somewhat pulverulent, chestnut-brown; teleutospores elliptical, 26–30 by 36–45μ, rounded at both ends, which are strongly introverted and concave when dry, much constricted at the septum, wall chestnut-brown, smooth, evenly thick, 3–4μ, apex slightly thicker with a very low semiyhaline umbo; pedicel colorless, about once length of spore.

On *Gymnolomia subflexuosa* Benth. & Hook., Oaxaca, Oct. 17, 1899, no. 3645 (type): *G. patens brachypoda* Rob. & Greenm., Jalapa, Oct. 2, 1898, no. 3113.

This species does not include the rusts on species of Gymnolomia occurring in the United States throughout the Rocky Mountain region, which belong to *Puccinia Helianthi* Schw.

21. PUCCINIA ENCELIAE Diet. and Holw.

On *Encelia adenophora* Greenm., Etzatlan, State of Jalisco, Oct. 2, 1903, no. 5092; Oaxaca, Nov. 10, 1903, no. 5360: *Encelia* sp., Guadalajara, Oct. 3, 1903, no. 5102.

22. **Puccinia Caleae,** n. sp.—Spermogonia epiphyllous, crowded, in small groups opposite the aecidia, punctiform, inconspicuous, globoid, 100–130μ broad: aecidia hypophyllous, in circular groups, peridia cylindrical, lacerate; aecidiospores globoid, 18–24 by 20–27μ, wall pale yellowish, thin, closely and prominently verrucose: uredosori amphigenous, in small groups or scattered, small, early naked, pulverulent, cinnamon-brown; uredospores globoid, or obovate-globoid, 20–24 by 24–30μ, wall dark cinnamon-brown, medium thick, 1.5–2.5μ, sparsely and strongly echinulate, pores 2, opposite and near the equator: teleutosori chiefly epiphyllous, scattered, 1–1.5^{mm} across, early naked, somewhat pulverulent, blackish; teleutospores obovate-oblong or ellipsoid, 20–30 by 40–54μ, obtuse above, narrowed below, sometimes rounded at both ends, slightly or not constricted at septum, wall dark chestnut-brown, smooth, thick, 3–3.5μ, apex unthickened, or with a more or less prominent and paler umbo, sometimes with a similar umbo on the lower cell next the septum; pedicel colorless, firm, once to twice length of spore.

On *Calea axillaris urticaefolia* Rob. & Greenm., Sayula, State of Jalisco, Oct. 8, 1903, no. 5126 (type): *C. Zacatechichi rugosa* Rob. & Greenm., Cuernavaca, Oct. 30, 1903, no. 5301: *C. hypoleuca* Rob. & Greenm., Oaxaca, Nov. 10, 1903, nos. 5364, 5384: *Calea* sp., Etzatlan, State of Jalisco, Oct. 2. 1903, no. 5097.

23. **Puccinia Axiniphylli,** n. sp.—Uredosori not seen; uredospores in the teleutosori ellipsoid or globoid, 16–24 by 21–26μ, wall yellowish, thin, 1–1.5μ, sparsely and strongly echinulate, pores probably 3 and equatorial, very indistinct: teleutosori hypophyllous, irregularly gregarious, or scattered, somewhat confluent, small, tardily and imperfectly naked, dull chestnut-brown; teleutospores oblong or obovate-oblong, irregular, large, 24–30 by 45–60μ, obtuse or obliquely truncate above, somewhat narrowed below, slightly or

not constricted at the septum, wall smooth, cinnamon-brown, or partly darker, rather thin, 1.5–2.5μ, much thickened above, 7–12μ; pedicel tinted, firm, 7–12μ broad, half length of spore or shorter.

On *Axiniphyllum tomentosum* Benth., Oaxaca, Oct. 21, 1899, no. 3710; Etla, State of Oaxaca, Nov. 13, 1903, no. 5393.

24. **Puccinia Noccae**, n. sp.—Uredorosi amphigenous, small, scattered, pulverulent, cinnamon-brown; uredospores globoid, 18–24 by 20–28μ, wall pale brown, rather thin, 1.5–2μ, evenly echinulate, pores 3, in the lower hemisphere, often close to the base: teleutosori amphigenous, small, scattered, blackish, somewhat pulverulent; teleutospores broadly oblong or elliptical, 26–31 by 32–42μ, rounded at both ends, or obtuse at apex, not constricted at septum, wall smooth, dark chestnut-brown, thick, 3–4μ, thicker at apex, 10–12μ, a broad semihyaline umbo at apex, often a similar one on the lower cell; pedicel colorless, firm, once to once and a half length of spore.

On *Nocca decipiens* Kuntze, Sayula, State of Jalisco, Oct. 7, 1903, no. 5122 (type): *N. rigida* Cav., Cuernavaca, Oct. 29, 1903, no. 5262: *N. suaveolens* (HBK.) Cass., Oaxaca, Oct. 23, 1899, no. 3724.

25. **Puccinia jaliscana**, n. sp.—Uredorosi hypophyllous, small, round, pale yellowish, soon naked, somewhat pulverulent; uredospores globoid or oblong-globoid, 18–24 by 21–27μ, pale brownish or nearly colorless, wall rather thin, 1.5–2μ, minutely echinulate-verrucose, pores 6–8, scattered: teleutosori chiefly hypophyllous, small, round, early naked, blackish, somewhat pulverulent; teleutospores elliptical, 20–24 by 30–39μ, rounded at both ends, slightly constricted at septum, semiopaque, wall chocolate-brown, prominently verrucose, thick, 2.3–3μ, slightly thicker at apex, 4–6μ; pedicel colorless, once or once and a half length of spore.

On *Porophyllum Holwayanum* Greenm., Sayula, State of Jalisco, Oct. 8, 1903, no. 5130.

26. PUCCINIA POROPHYLLI Henn.

On *Porophyllum macrocephalum* DC., Cardenas, Oct. 22, 1898, no. 3152; Yautepec, Oct. 24, 1903, no. 5238: *Porophyllum* sp., Guadalajara, Sept. 15, 1899, no. 3431; Chapala, Sept. 17, 1899, no. 3439 bis.

27. PUCCINIA TAGETICOLA Diet. and Holw.

On *Tagetes tenuifolia* Cav., Sept. 12, 1899, no. 3403; Etla, State of Oaxaca, Nov. 16, 1903, no. 5425: *T. filifolia* Lag., Cuernavaca, Sept. 26, 1898, no. 3031;

Guadalajara, Sept. 28, 1903, no. 5028: *T. lucida* Cav., Patzcuaro, Oct. 19, 1898, no. 3233; Cuernavaca, Oct. 29, 1903, no. 5264: *T. micrantha* Cav., San Angel, City of Mexico, Oct. 1, 1900 (*C. G. Pringle*): *Tagetes* sp., Guadalajara, Sept. 15, 1899, no. 3423; Oaxaca, Oct. 20, 1899, no. 3685; City of Mexico, Oct. 19, 1903, no. 5179.

28. PUCCINIA ZEXMENIAE Diet. and Holw.

On *Zexmenia podocephala* A. Gr., Patzcuaro, Oct. 20, 1898, no. 3215, Oct. 13, 1899, no. 3626; Chapala, Sept. 20, 1899, no. 3468: *Z. fasciculata* A. Gr., Patzcuaro, Oct. 18, 1898, no. 3101; Cuernavaca, Sept. 30, 1899, no. 3530: *Z. ceanothifolia* Schz. Bip., Guadalajara, Sept. 28, 1903, no. 5058; Cuernavaca. Oct. 29, 1903, no. 5268: *Z. helianthoides* A. Gr., Cuernavaca, Sept. 30, 1899, no, 3531: *Z. elegans* Schz. Bip., Patzcuaro, Oct. 13, 1899, no. 3632: *Z. crocea* A. Gr., Cuernavaca, Sept. 25, 1898, no. 3016; Cuautla, State of Morelos, Oct. 23, 1903, no. 5232: *Z. aurea* B. & H., Rio Hondo, near City of Mexico, Oct. 4, 1899, no. 3566: *Zexmenia* sp., Chapala, Oct. 5, 1903, no. 5116.

A number of these collections have well developed aecidia with the other spores, and no. 3016 shows only aecidia. The teleutospores are quite variable in size and roughness of surface.

29. PUCCINIA OPACA Diet. and Holw.

On *Zexmenia* sp., Guadalajara, Sept. 29, 1903, no. 5069; Patzcuaro, Oct. 16, 1898, no. 3002.

One of these collections, no. 5069, shows aecidia in good condition. The aecidia are deep-seated in the tissues, appear hemispherical on the surface, and open by a small orifice; the peridial cells are loosely united, and fall away readily; the aecidiospores are somewhat smaller than those in *Puccinia Zexmeniae*, and have a thicker wall.

30. **Puccinia Diaziana,** n. sp.—Teleutosori hypophyllous, in open groups, 3–8^{mm} across, on pale spots, often annular, small, 0.25^{mm} or less in diameter, round, pulvinate, chestnut-brown or lighter; teleutospores linear-oblong or oblong-fusiform, 15–21 by 38–54μ, usually narrowed and obtuse at each end, slightly constricted at septum, wall cinnamon-brown, paler below, smooth, thin, 1–1.5μ, much thickened at apex, 5–8μ; pedicel slightly tinted, thick, half length of spore.

On *Ximensia encelioides* Cav. (*Verbesina encelioides* A. Gr.), City of Porfirio Diaz, State of Coahuila, Oct. 10, 1900.

This species belongs to the LEPTOPUCCINIA section, as the spores germinate freely in the sorus, centrifugally as they mature. It differs from most species of this section inhabiting composite hosts by having the sori well separated from one another, instead of crowded in a compact group.

31. **Puccinia semiinsculpta,** n. sp.—Uredosori amphigenous, scattered, round, small, 0.2–0.3^{mm} across, cinnamon-brown, soon naked, pulverulent; uredospores broadly elliptical or globoid, 17–25 by 22–28μ, wall 2μ thick, echinulate, pores indistinct, probably 3 and equatorial: teleutosori amphigenous, or often only epiphyllous, scattered, round, small, 0.2–0.5^{mm} across, often confluent, soon naked, pulverulent, chocolate-brown, or compact and cinereous from germination; teleutospores broadly elliptical or elliptical-obovate, 25–36 by 40–50μ, round at both ends, or narrowed below, slightly or not constricted at septum, wall finely to coarsely reticulate-verrucose, thick, 4–6μ, slightly or not thickened at apex, 5–9μ, concolorous, often thinner below; pedicel colorless, 4–7μ thick, once to twice length of spore, more or less minutely rough.

On *Vernonia Alamani* DC., Amecameca, Oct. 31, 1899, no. 3754 (type); Patzcuaro, Oct. 17, 1898, no. 3105, Oct. 10, 1899, no. 3602, Oct. 13, 1899, no. 3631; Oaxaca, Nov. 11, 1903, no. 5379; Amecameca, Oct. 20, 1903, no. 5190: *Vernonia* sp., Chapala, Sept. 19, 1899, no. 3459; Cuernavaca, Sept. 30, 1899, no. 3540; Oaxaca, Oct. 18, 1899, no. 3668.

The different collections vary in appearance. In some of the collections most or all of the sori are dark and pulverulent, in others they are compact and pale from germination, while in others its two forms are variously intermixed. The spores from germinating sori are thinner-walled, lighter-colored, and more obovate. The extreme forms are quite unlike, but all gradations occur, even on the same leaf. The uredosori are quite inconspicuous.

32. **Puccinia egregia,** n. sp.—Uredospores from the teleutosori globoid, 23–26 by 24–28μ, wall golden-yellow, rather thin, echinulate, pores 3, equatorial: teleutosori amphigenous, scattered, pulvinate, chocolate-brown; teleutospores ellipsoid, 27–30 by 35–46μ, rounded at both ends, slightly or not constricted at septum, wall thick, 4–6μ, slightly or not thickened at apex, coarsely and prominently verrucose, with conical and well separated papillae; pedicel colorless, 5–6μ thick, twice length of spore.

On *Vernonia uniflora* Schz. Bip., Oaxaca, Dec. 29, 1895, no. 1739 (*Seler*).

This specimen was obtained in looking over the phanerogamic herbarium at the New York Botanical Garden. It is a very marked species. The host was determined by VOLKENS, as recorded on the label.

33. PUCCINIA ELECTRAE Diet. and Holw.

On *Electra Galeottii* A. Gr., Oaxaca, Nov. 11, 1903, no. 5387, Nov. 13, 1903, no. 5394.

34. **Puccinia Zaluzaniae,** n. sp.—Uredosori chiefly epiphyllous, scattered, round, small, soon naked, ruptured epidermis evident; uredospores obovate, 16–21 by 23–27μ, wall golden-brown, rather thin, 1.5–2μ, sparsely and finely echinulate, pores 2, opposite in the equator: teleutosori chiefly epiphyllous, scattered, very small or punctiform, confluent, somewhat pulverulent, blackish; teleutospores semiopaque, ellipsoid, 21–27 by 39–45μ, obtuse or rounded at both ends, slightly or not constricted at septum, wall dark chocolate-brown, minutely rugose, medium thick, 1.5–2.5μ, thicker at apex; pedicel colorless except next the spore, tapering downward, lowest third noticeably roughened, twice length of spore.

On *Zaluzania asperrima* Schz. Bip., Tehuacan, Nov. 7, 1903, no. 5347.

This species is much like *Puccinia Electrae*, but has smaller and less roughened spores, which form smaller sori.

35. Puccinia Cirsii Lasch.

On *Carduus lomatolepis* (Hemsl.), City of Mexico, Oct. 14, 1898, no. 3047: *C. orizabensis* (Klatt.), Toluca, Sept. 19, 1898, no. 3133: *Carduus* sp., Patzcuaro, Oct. 17, 1898, no. 3102; Uruapan, Oct. 11, 1899, no. 3616; Etla, State of Oaxaca, Oct. 23, 1899, no. 3730.

36. **Puccinia concinna,** n. sp.—Uredospores in the teleutosori globoid, 19–22 by 24–28μ, wall thin, 1μ, minutely echinulate, pores 4, approximately equatorial: teleutosori chiefly hypophyllous, scattered, roundish, 0.5–1^{mm} across, pulvinate, blackish; teleutospores oblong or ellipsoid, 24–30 by 37–50μ, rounded or obtuse at apex, rounded below, slightly or not constricted at septum, wall chocolate-brown, smooth, thick, 3–3.5μ, thicker above, 6–10μ, concolorous; pedicel colorless, except next the spore, delicate, once to thrice length of spore, often deciduous.

On *Conoclinium Greggii* (A. Gr.) Small (*Eupatorium Greggii* A. Gr.), Sierre Madre, Sept. 29, 1899, *E. W. Nelson*, comm. W. G. Farlow.

This species is much like the South American *P. Eupatorii* Diet., but differs in having thinner-walled uredospores, with twice as many pores, and much thicker-walled teleutospores. The sorus of the North American form is also larger and earlier naked.

37. Puccinia inanipes Diet. and Holw.

On *Eupatorium brevipes* DC., Oaxaca, Nov. 10, 1903, no. 5375: *E. hirsutum* DC., Cuernavaca, Oct. 30, 1903, no. 5274: *Eupatorium* sp., Sayula, State of Jalisco, Oct. 8, 1903, no. 5128.

38. PUCCINIA ESPINOSARA Diet. and Holw.

On *Eupatorium espinosarum* A. Gr., Oaxaca, Nov. 10, 1903, no. 5366: *E. Smithii* Rob., Oaxaca, Nov. 10, 1903, no. 5365.

39. PUCCINIA CONOCLINII Seym.

On *Eupatorium Neaeanum* DC., Etla, State of Oaxaca, Nov. 13, 1903, no. 5410.

40. **Puccinia rosea** (D. and H.), n. n.

On *Eupatorium deltoideum* Jacq., Amecameca, Oct. 20, 1903, no. 5202; Oaxaca, Oct. 21, 1899, no. 1119: *E. tubiflorum* Benth., Patzcuaro, Oct. 17, 1898, no. 3007, Oct. 19, 1898, no. 3232, Oct. 10, 1899, no. 3600: *E. glabratum* HBK., Pachuca, Oct. 28, 1903, no. 5255; Amecameca, Oct. 22, 1903, no. 5204: *E. trinervium* Schz. Bip., Oaxaca, Nov. 14, 1903, no. 5418: *E. Gonzalezii* Rob., Etla, State of Oaxaca, Nov. 13, 1903, no. 5403: *Eupatorium* sp., Cuernavaca, Sept. 26, 1898, no. 3013; Patzcuaro, Oct. 17, 1898, no. 3100: *Stevia rhombifolia* HBK., Jalapa, Oct. 2, 1898, no. 3107; Pachuca, Oct. 5, 1899, no. 3581, also Sept. 1, 1903, no. 6724 (*Rose & Painter*): *Ageratum corymbosum* Zacc., Yautepec, Oct. 23, 1903, no. 5235; Cuernavaca, Sept. 28, 1899, no. 3509: *A. strictum* Cuernavaca, Sept. 30, 1899, no. 3533.

The uredospores and teleutospores of this species closely resemble those of *Puccinia Conoclinii*, but are noticeably larger.

41. PUCCINIA DESMANTHODII Diet. and Holw.

On *Desmanthodium fruticosum* Greenm., Oct. 9, 1903, no. 5130: *D. ovatum* Benth., Etla, State of Oaxaca, Nov. 13, 1903, no. 5402.

42. **Puccinia paupercula,** n. sp.—Teleutosori hypophyllous, crowded in orbicular groups, 1–4^{mm} across, minute, punctiform, confluent, soon naked, compact, chocolate-brown, usually cinereous by germination; teleutospores oblong or lance-oblong, 15–17 by 39–50μ, acute or obtuse at apex, obtuse or narrowed at base, slightly or not constricted at septum, wall smooth, rather thin, thicker at apex, 7–9 μ; pedicel colored like the spore, firm, one half length of spore or less.

On *Elephantopus spicatus* Juss., Veracruz, Oct. 5, 1898, no. 3074.

This species differs from *Puccinia Elephantopodis* P. Henn., from Argentine, by the position and arrangement of the sori, as well as in the shape and size of the spores.

43. PUCCINIA ABRUPTA Diet. and Holw.

On *Viguiera excelsa* Benth. & Hook., City of Mexico, Oct. 18, 1903, no. 5174; Amecameca, Oct. 20, 1903, no. 5197: *V. tenuis* A. Gr., Guadalajara,

Sept. 30, 1903, no. 5079: *V. helianthoides* HBK., Santa Fé, near City of Mexico, Oct. 18, 1903, no. 5173; Tehuacan, Nov. 8, 1903, no. 5358: *V. buddleiformis* Benth. & Hook. f., Patzcuaro, Oct. 20. 1898, no. 3217, Oct. 13, 1899, no. 3630; Rio Hondo near City of Mexico, Oct. 4, 1899, no. 3563; Morelia, Oct. 14, 1899, no. 3634: *Viguiera* sp., Guadalajara, Sept. 29, 1903, no. 5070.

The teleutospores on each species of host differ a little from all the others. It would be possible to make as many species of rusts as there are species of Viguiera, but the differences are of a character that can very plausibly be ascribed to the influence of the host, and it seems more in keeping with the present conception of species, therefore, to list these slight variations, whose limits are yet undetermined, under a single name. The specimens cited, therefore, include what have been separated as *Puccinia abrupta* D. & H. and P. *subglobosa* D. & H. An examination of the type material of *P. Viguierae* Peck, discloses the fact that the host was incorrectly determined by the collector. The rust is clearly not one of the forms on Viguiera, but is doubtless *P. Helianthi* Schw.

44. PUCCINIA NANOMITRA Syd.

On *Viguiera eriophora* Greenm., Oaxaca, Oct. 21, 1899, no. 3689: *V. dentata* Spreng., Oaxaca, Oct. 25, 1899, no. 3744.

45. PUCCINIA IOSTEPHANES Diet. and Holw.

On *Iostephane heterophylla* Benth., Cuernavaca, Oct. 30, 1903, no. 5291.

46. PUCCINIA COGNATA Syd.

On *Verbesina tetraptera* A. Gr., City of Mexico, Oct. 11, 1898, no. 3061; Rio Hondo, near City of Mexico, Oct. 4, 1899, no. 3564; Patzcuaro, Oct. 13, 1899, no. 3627; Oaxaca, Oct. 21, 1899, no. 3706: *V. pinnatifida* Cav., Cuernavaca, Nov. 1, 1903, no. 5307: *V. sphaerocephala* A. Gr., Zapotlan, State of Jalisco, Oct. 9, 1903, no. 5141: *V. montanoifolia* Rob. & Greenm., Patzcuaro, Oct. 16, 1898, no. 3000, Oct. 10, 1899, nos. 3605, 3606; Morelia, Oct. 8, 1899, no. 3592.

The collection on *V. sphaerocephala* is without teleutospores, and is referred here with some slight doubt, as the uredospores of several related species are much alike. In deciding upon the boundaries of this species it has not been possible to agree with SYDOW in his *Monographia Uredinearum*. The Schweinitzian species, which is founded upon a South Carolina collection, probably on *Verbesina occidentalis*, although the specific determination was not made at the time, appears to be confined to southeastern United States, and is not yet reported on any other host than *V. occidentalis*. The species named by LONG *Puccinia similis*, and changed by SYDOW to *P. cognata*, occurs from Texas southward, upon a variety of hosts. It may be identical with the South American *P. Spegazziniana* DeT., but the exact proof is not at hand. The form on *P. montanoifolia* has slightly smaller and paler spores, but otherwise the same. No. 3606 is accompanied by an abundance of aecidia.

47. PUCCINIA FEROX Diet. and Holw.

On *Verbesina diversifolia* DC., Oaxaca, Oct. 21, 1899, no. 3692; Etla, Oaxaca, Nov. 14, 1903, no. 5396.

48. PUCCINIA AFFINIS Syd.

On *Verbesina trilobata* Rob. & Greenm., Oaxaca, Nov. 15, 1903, no. 5420: *Verbesina* sp., Etzatlan, State of Jalisco, Oct. 2, 1903, no. 5093.

49. PUCCINIA TUBERCULANS E. and E.

On *Aplopappus spinulosus* DC., Aguas Calientes, Sept. 12, 1899, no. 3404: *Bigelovia veneta* A. Gr., Pachuca, Oct. 27, 1903, no. 5250, Oct. 5, 1899, no. 3584.

50. PUCCINIA PRAEMORSA Diet. and Holw.

On *Brickellia veronicaefolia* A. Gr., Tehuacan, Nov. 7, 1903, no. 5343.

51. PUCCINIA DECORA Diet.

On *Brickellia megalodonta* Greenm., Guadalajara, Sept. 22, 1903, no. 5022.

52. PUCCINIA INVESTITA Schw.

On *Gnaphalium semiamplexicaule* DC., Santa Fé, near City of Mexico, Oct. 13, 1903, no. 5175; Amecameca, Oct. 20, 1903, no. 5191: *G. leptophyllum* DC., Nevada de Toluca, Oct. 15, 1903, no. 5155: *G. oxyphyllum* DC., Amecameca, Oct. 20, 1903, no. 5194: *Gnaphalium* sp., Oaxaca, Nov. 11, 1903, no. 5381.

53. PUCCINIA EVADENS Harkn.

On *Baccharis glutinosa* Pers., Etla, State of Oaxaca, Nov. 13, 1903, no. 5409: *B. pteronicoides* DC., Patzcuaro, Oct. 14, 1898, no. 3099: *Baccharis* sp., City of Mexico, Sept. 20, 1896.

54. PUCCINIA BACCHARIDIS-MULTIFLORAE Diet. and Holw.

On *Baccharis multiflora* HBK., Santa Fé, near City of Mexico, Oct. 18, 1903, no. 5166; Amecameca, Nov. 20, 1903, no. 5430: *B. elegans* HBK., Oaxaca, Nov. 11, 1903, no. 5382.

PURDUE UNIVERSITY,
Lafayette, Ind.